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Tucson Electric Power  
88 East Broadway Blvd., P.O. Box 711,  
Tucson, AZ 85702

January 31, 2014

Docket Control  
Arizona Corporation Commission  
1200 West Washington Street  
Phoenix, AZ 85007

Re: Notice of Filing – Tucson Electric Power Company's 2014-2023 Ten-Year Plan  
Docket No. E-00000D-13-0002

Pursuant to ARS § 40-360.02, enclosed please find an original and thirteen copies of  
Tucson Electric Power Company's ("TEP") 2014-2023 Ten-Year Plan.

If you have any questions, please contact me at (520) 884-3680.

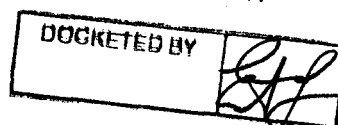
Sincerely,

Jessica Bryne

cc: Ed Stoneburg, Utilities Division, ACC  
Compliance Section, ACC

Arizona Corporation Commission  
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JAN 31 2014



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# Tucson Electric Power

## **TEN-YEAR PLAN FOR YEARS 2014-2023**

**SUBMITTED TO THE  
ARIZONA CORPORATION COMMISSION  
JANUARY 2014**

**DOCKET NO: E-00000D-13-0002**

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## **INTRODUCTION**

This 2014-2023 Ten-Year Plan is submitted by Tucson Electric Power Company ("TEP") pursuant to A.R.S. § 40-360.02. Included with this plan are transmission facilities planned for the Tucson Electric Power service territories.

Previously reported planned projects that have been canceled are not included. Projects not expected to be built within the ten-year planning horizon with in-service dates shown as to be determined ("TBD") are considered "conceptual projects", distinguishing them from "planned projects" that are within the ten-year time frame. These conceptual projects may become planned projects as they move into the ten-year planning horizon in subsequent studies. Projects completed in the year prior to current year are designated as completed for tracking purposes.

This report includes system maps depicting the existing transmission networks and planned or conceptual projects followed by individual project descriptions. The maps and descriptions are intended to be general planning-level documents to explain projects conceptually. Therefore the maps and descriptions do not represent specific routes or geographically correct facility locations.

### **Load Forecasting**

TEP's 2014 – 2023 Ten-Year Plan was developed based on TEP's approved Corporate Forecast. The ten-year demand forecast that was specifically developed for transmission planning was approved in January of 2013. This forecast takes into account distributed renewable generation ("DG") and energy efficiency ("EE") programs, as well as TEP's retail customer load.

### **Effects of Distributed Renewable Generation and Energy Efficiency Programs**

In the 6th BTA (Decision 72031, December 10, 2010), the Arizona Corporation Commission ("Commission") ordered jurisdictional utilities to address the effects of distributed renewable generation and energy efficiency programs on future transmission needs in their ten-year plan filings. Additional analysis was conducted to determine how TEP's ten-year plan would be affected by the absence of load reductions realized through DG and EE programs. Without the load offset through the DG and EE programs, the studies performed indicate that TEP would require 13 additional projects and would need to accelerate the construction of nine planned projects. Those accelerated projects would include a reconductor of one 138kV transmission line, and eight 138kV shunt capacitor bank upgrades. The additional projects would include the reconductor of three 138kV transmission lines, six new 138kV shunt capacitor banks, and four 138kV shunt capacitor bank upgrades. See end of report for a list of specific projects. The analysis did not address the additional generation and distribution costs TEP may incur due to DG.

## **Reliability Must Run (“RMR”) Studies**

In the 7th Biennial Transmission Assessment (“BTA”) (Decision no. 73625, December 12, 2012), the Commission suspended its requirement for RMR studies and established criteria for resuming them based on a biennial review of the following factors:

- 1) An increase in load of more than 2.5% in load forecast relative to the final RMR study year for which RMR studies were last filed; or
- 2) Planned retirement (or an expected long-term outage during the June-August time period) of a transmission or substation facility required to serve an RMR load pocket, unless the facility being retired will be replaced with a comparable facility before the next summer season; or
- 3) Planned retirement (or an expected long-term outage during the June-August time period) of a generating unit in an RMR load pocket that has been utilized in the past for RMR purposes, unless a generator being retired will be replaced with a comparable unit before the next summer season; or
- 4) A significant customer outage (the greater of 100 MW or 10% of the peak demand in the RMR pocket) in an RMR load pocket during summer months.

Accordingly, TEP has not included an RMR study in this ten-year plan because none was required under these criteria. Analysis of the relevant criteria shows that:

- TEP currently projects a peak load of 2736 megawatts (“MW”) for the Tucson load pocket in 2021, the final year for which RMR studies were last filed. That projection is slightly lower than the forecasted peak load of 2743 MW anticipated by the RMR study performed for the 7th BTA.
- TEP does not plan to retire any generating units, transmission facilities, or substation facilities in the Tucson RMR load pockets.
- TEP does not have any significant customer outages planned for the summer months in the Tucson RMR load pockets.

## **Planning the Extra High Voltage Transmission System**

TEP has both 500kV and 345 kV on its Extra High Voltage (“EHV”) system. TEP is a member of both the WestConnect Region and the Southwest Area Transmission (“SWAT”) Sub-Regional Planning Group. TEP actively participates in various WestConnect committees and SWAT subcommittees to ensure that its EHV system is studied properly and that issues are addressed and planned for as they arise.

### **Extra High Voltage Transmission Project Categories**

The EHV project summaries have been divided into categories that summarize the placement of each of the projects.

- Planned EHV Transmission Projects are those with planned in-service dates that fall within the ten-year planning window to support the TEP EHV system.
- Planned Reactive EHV Projects are projects that will provide voltage support for the TEP EHV system.
- Conceptual EHV Transmission Projects are composed of projects that either have a CEC in place or have been included within previous ten-year plans but are not

scheduled in service within the ten-year planning horizon and no in-service date has been determined.

See *Figures 1, 2 and 3* for maps depicting approximate routing and project locations for the EHV projects.

### **Planning the Local High Voltage (138kV) Transmission System**

TEP conducts an annual review of its 138 kilovolt (“kV”) High Voltage (“HV”) Transmission System performance over a ten-year planning horizon. This results in identification of new facilities and upgrades to existing facilities, with associated in-service dates as needed to ensure adequate transmission capacity within TEP’s service territory as the Tucson metropolitan area continues to develop. Capital improvements are proposed for the TEP 138kV system to accommodate new 138/13.8kV, substations to address increased transmission facility loading, and to mitigate localized stability issues.

Power flow analysis is conducted to identify thermal overloads and voltage violations under normal and contingency conditions in compliance with the North American Electric Reliability Corporation (“NERC”) Reliability Standards and Western Electricity Coordinating Council (“WECC”) System Performance Regional Business Practices. Proposed projects are then determined such that the performance measures of the NERC Reliability Standards and WECC System Performance Regional Business Practices are met for Category A, B and C conditions.

#### **High Voltage Project Categories**

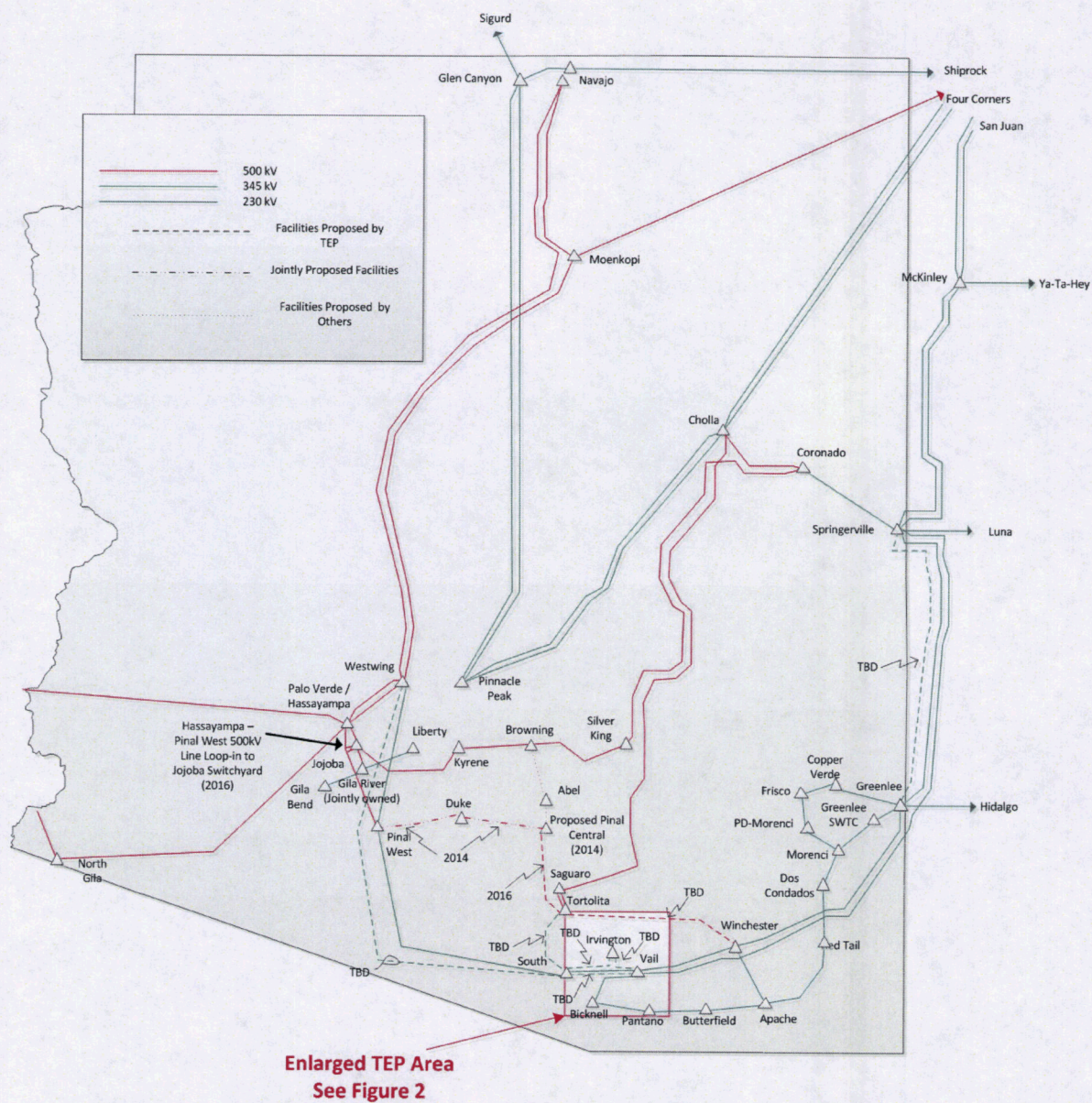
The 138kV (High Voltage) project summaries have been divided into categories that summarize the placement of the project.

- Planned 138kV Transmission Projects are those with planned in service dates that fall within the ten-year planning window as needed to support the local TEP 138kV system. Projects that have been completed in year prior to filing have been placed within this category for record keeping purposes.
- Planned 138kV Reactive Projects are projects that will provide voltage support for the local TEP 138kV system.
- Conceptual 138kV Projects are composed of projects that may have a CEC in place, have been included within previous ten-year plans, but are not scheduled in service within the ten-year planning horizon and/or are part of a project that has been phased and portions of the phasing remain incomplete. No in-service date has been determined.

See *Figure 4* for a map depicting approximate routing and project locations for the above described projects

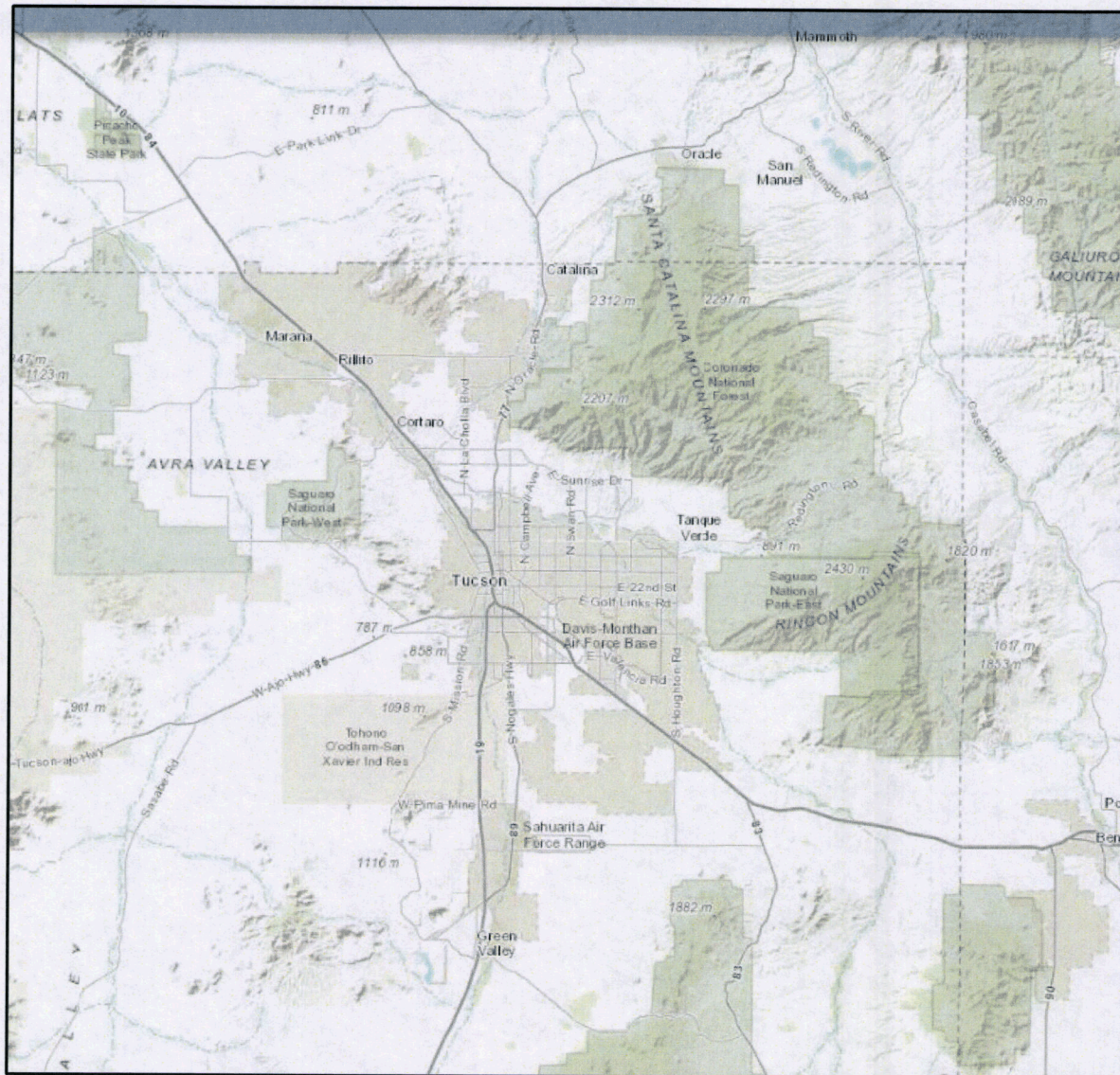
## Extra High Voltage (EHV) Transmission





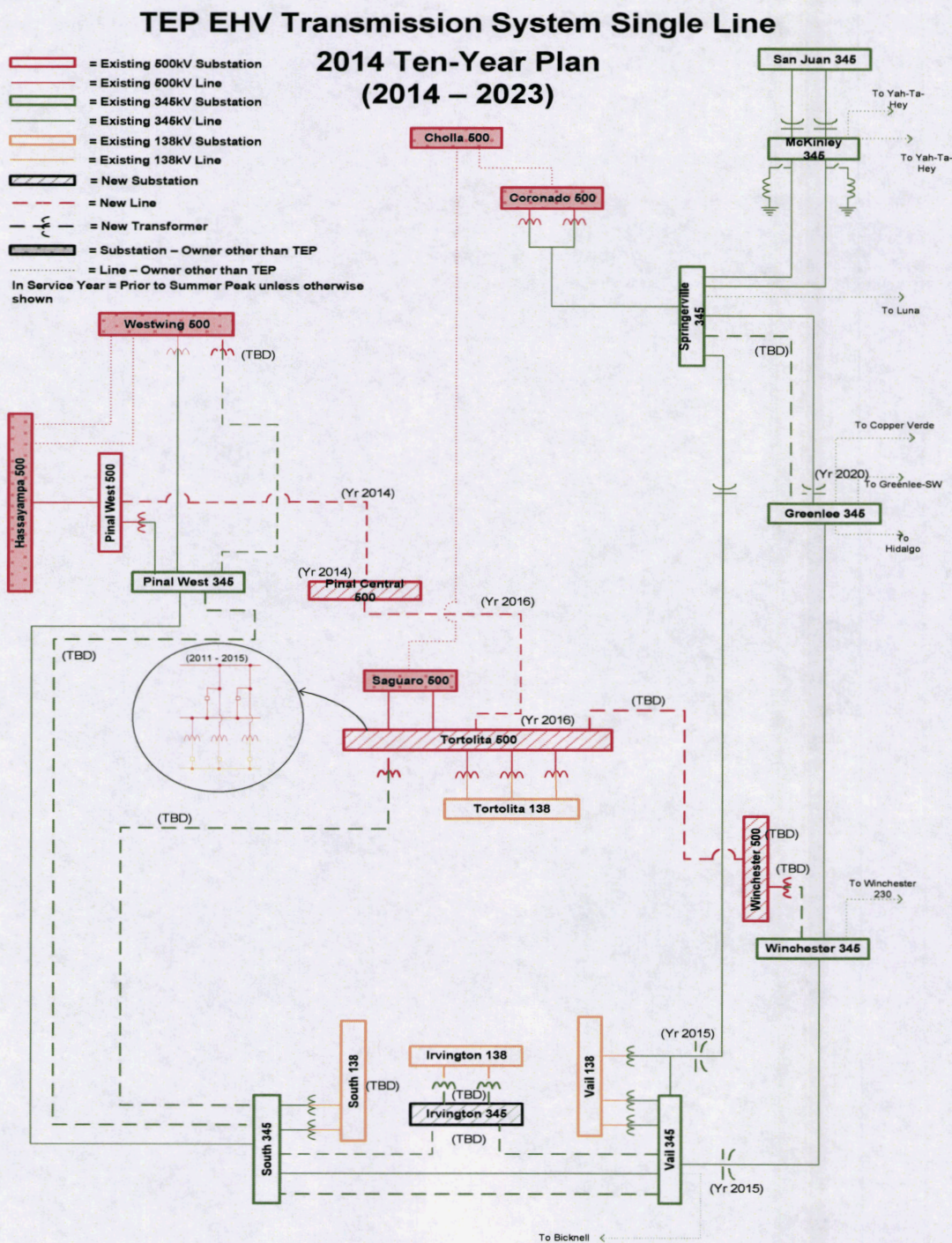
**Figure 1.** Existing and Planned EHV Transmission Facilities Map





**Figure 2.** Local Existing and Planned EHV Transmission Facilities Map





**Figure 3.** Existing and Planned EHV Transmission Facilities Single-Line Diagram

## Planned EHV Transmission Projects

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TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Hassayampa – Pinal West 500kV Line Loop-in to Jojoba Switchyard
Size	
a) Voltage	500-kV
b) Capacity	System dependent
c) Point of Origin	Jojoba substation
d) Point of Termination	Interconnection with existing Hassayampa – Pinal West line
e) Length	Less than 3 spans
Routing	Drop in from existing line into existing switchyard
Purpose	To provide connectivity between two existing 500kV transmission lines.
Date	
a) Construction Start	TBD
b) In-Service Date	2015
Is Certificate Necessary	No, case # 124
Technical Studies	Interconnection studies are in progress

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Pinal Central Substation to Tortolita Substation
Size	
a) Voltage	500-kV
b) Capacity	System dependent
c) Point of Origin	Future Pinal Central substation
d) Point of Termination	Tortolita Substation (Sec. 14 T10S R10E)
e) Length	Approximately 40 miles
Routing	In accordance with the CEC approved in Decision No. 73282 (July 30, 2012).
Purpose	To reinforce TEP's EHV system and to provide a higher capacity link for the flow of power from the Palo Verde area into TEP's northern service territory.
Date	
a) Construction Start	2014
b) In-Service Date	2016
Is Certificate Necessary	Case # 165
Technical Studies	Completed

## Planned Reactive EHV Projects

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TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Series Capacitor Replacement at Vail 345kV Substation (Springerville – Vail 345kV Line)
Size	
a) Voltage	345-kV
b) Capacity	1195 MW Continuous/1494 MW Emergency
c) Point of Origin	Vail Substation
d) Point of Termination	Vail Substation
e) Length	NA
Routing	NA
Purpose	To upgrade existing equipment.
Date	
a) Construction Start	2015
b) In-Service Date	2015
Is Certificate Necessary	No
Technical Studies	Completed

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Series Capacitor Replacement at Vail 345kV Substation (Winchester – Vail 345kV Line)
Size	
a) Voltage	345-kV
b) Capacity	1195 MW Continuous/1494 MW Emergency
c) Point of Origin	Vail Substation
d) Point of Termination	Vail Substation
e) Length	NA
Routing	NA
Purpose	To upgrade existing equipment.
Date	
a) Construction Start	2015
b) In-Service Date	2015
Is Certificate Necessary	No
Technical Studies	Completed

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Series Capacitor Replacement at Greenlee 345kV Substation (Springerville – Greenlee 345kV Line)
Size	
a) Voltage	345-kV
b) Capacity	1195 MW Continuous/1494 MW Emergency
c) Point of Origin	Greenlee Substation
d) Point of Termination	Greenlee Substation
e) Length	NA
Routing	NA
Purpose	To upgrade existing equipment.
Date	
a) Construction Start	2019
b) In-Service Date	2020
Is Certificate Necessary	No
Technical Studies	Completed

## Conceptual EHV Transmission Projects

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TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Vail Substation to Irvington Substation
Size	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination	Irvington Substation (Sec. 03 T15S R14E)
e) Length	Approximately 11 miles
Routing	Unknown
Purpose	To reinforce TEP's EHV system and to provide a new tie between TEP's HV and EHV systems.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Yes
Technical Studies	Studies in progress via SWAT and internal TEP study efforts.



TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Irvington Substation to South Substation
Size	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Irvington Substation (Sec. 03 T15S R14E)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	Approximately 16 miles
Routing	Unknown
Purpose	To reinforce TEP's EHV system and to provide a new tie between TEP's HV and EHV systems.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Yes
Technical Studies	Studies in progress via SWAT and internal TEP study efforts.

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Tortolita Substation to Winchester Substation
Size	
a) Voltage	500-kV
b) Capacity	System dependent
c) Point of Origin	Tortolita Substation (Sec. 14 T10S R10E)
d) Point of Termination	Winchester Substation
e) Length	Approximately 80 miles
Routing	In accordance with the CEC approved in Decision 46801 (January 23, 1976).
Purpose	To reinforce TEP's EHV system and to provide a higher capacity link for the flow of power from the Palo Verde area into TEP's eastern transmission system.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Case # 23
Technical Studies	Studies in progress via SWAT and internal TEP study efforts.

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Vail Substation to South Substation – 2 <sup>nd</sup> circuit
Size	
a) Voltage	345-kV or 500-kV
b) Capacity	System dependent
c) Point of Origin	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	14 miles
Routing	Parallel and adjacent to existing Vail – South Line
Purpose	To reinforce TEP's EHV system and to provide additional transmission capacity between Vail and South Substations
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Case # 15
Technical Studies	Studies have been performed via SWAT and internal TEP study efforts.

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Springerville Substation to Greenlee Substation - 2 <sup>nd</sup> circuit
Size	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Springerville Substation (Sec. 34 T11N R30E)
d) Point of Termination	Greenlee Substation (Sec. 29 T5S R31E)
e) Length	110 Miles total; 27 Miles in Arizona.
Routing	Parallel and adjacent to existing Springerville to Greenlee line.
Purpose	To deliver power and energy from major TEP interconnections in the Four Corners and Eastern Arizona regions.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Case #'s 12, 30, 63 and 73
Technical Studies	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Tortolita Substation to South Substation
Size	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Tortolita Substation (Sec. 23 T10S R10E)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	68 Miles
Routing	From Tortolita Substation south through Avra Valley to existing Westwing-South 345-kV transmission line right-of-way, then parallel and adjacent to existing Westwing – South line to South Substation.
Purpose	To reinforce TEP's EHV system and to provide a high capacity link for the flow of power in Southern Arizona.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Case # 50
Technical Studies	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 70's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

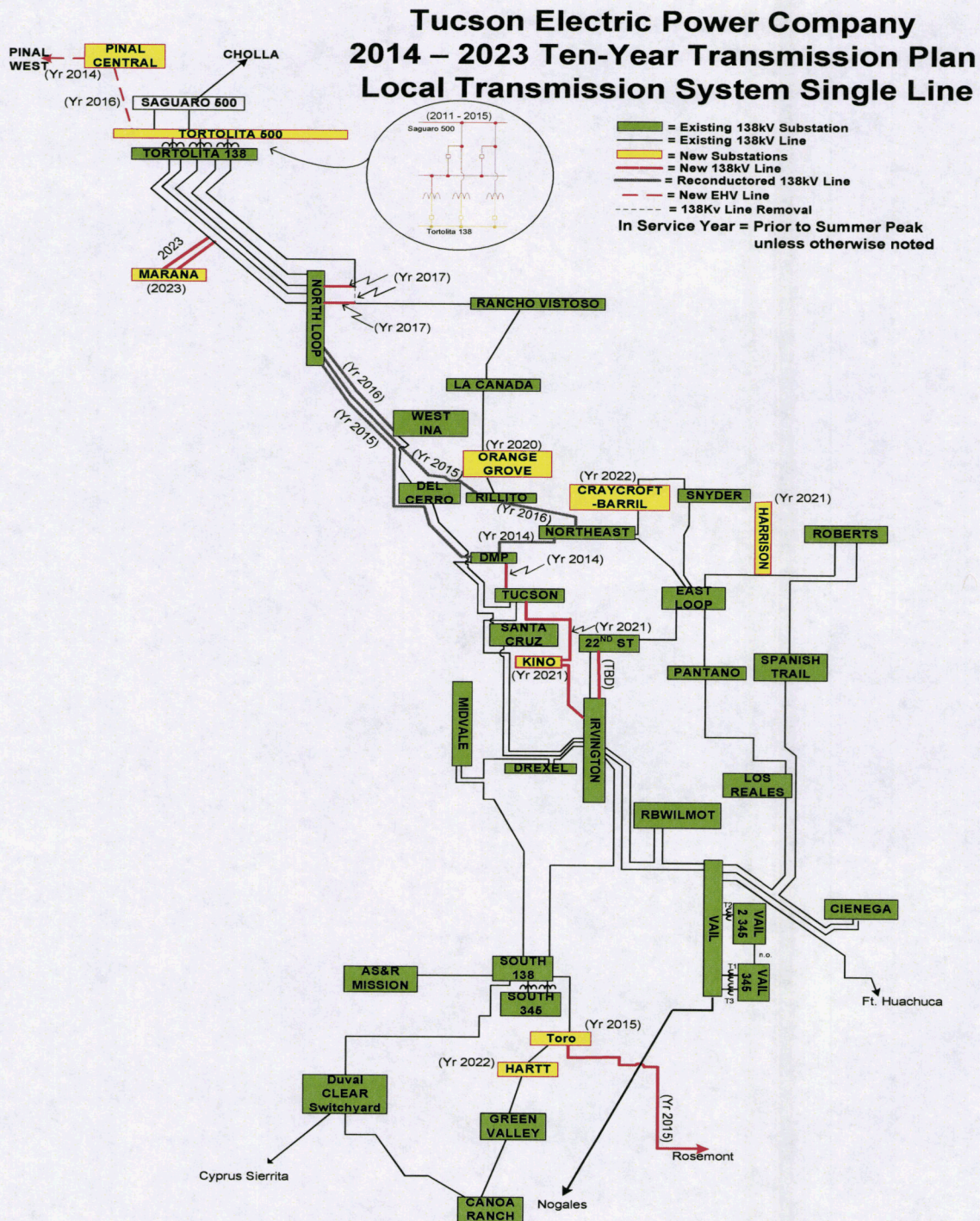
TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Westwing Substation to South Substation – 2 <sup>nd</sup> circuit
Size	
a) Voltage	345-kV or 500-kV
b) Capacity	System dependent
c) Point of Origin	Westwing Substation (Sec. 12 T4N R1W)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	178 Miles
Routing	Parallel and adjacent to existing Westwing to South line and will include loop-in to Pinal West.
Purpose	To deliver power and energy from major TEP interconnections in the Northwest Phoenix region.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Case # 15
Technical Studies	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP. To be reviewed in SWAT and internal TEP studies.

## High Voltage (138kV) Transmission Projects

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**Figure 4.** TEP Local Area 138kV Ten Year Transmission Plan



## Planned 138kV Transmission Projects

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	South Substation to Duval CLEAR Switchyard through Canoa Ranch Substation and Green Valley Substation	
Size		
a) Voltage	138-kV	
b) Capacity	System dependent	
c) Point of Origin	South Substation (Sec. 36 T16S R13E)	
d) Point of Termination	Duval CLEAR Switchyard (Sec. 10 T18S R12E)	
e) Length	South – Green Valley – Approximately 15 miles  Green Valley – Canoa Ranch – Approximately 3.5 miles  Canoa Ranch – Duval CLEAR Switchyard – Approximately 7.5 miles	
Routing	Uses existing transmission, sub-transmission, and overhead distribution route.	
Purpose	To provide additional electrical service to southern area of TEP's service area and to reinforce the local transmission and distribution system.	
Date		
a) Construction Start	1995	
b) In-Service Date	Phase 1 -1997 (Completed)	South 138-kV line to Green Valley.
	Phase 2a -2006 (Completed)	138-kV line from Green Valley to Canoa Ranch Substation
	Phase 2b- 2013 (Completed <sup>1</sup> )	Extend 138-kV line from Canoa Ranch Substation site to future Duval CLEAR Switchyard

<sup>1</sup> This project will be removed in future Ten-Year Plans

Is Certificate Necessary

Case # 84  
(Extension approved in 2006 Commission  
Decision No. 69680 (June 28, 2007))

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	DeMoss Petrie Substation – Tucson Station 138 kV
Size	
a) Voltage	138-kV
b) Capacity	System dependent
c) Point of Origin	DeMoss Petrie 138 kV Substation
d) Point of Termination	Tucson 138 kV Substation
e) Length	2.5 miles
Routing	South from DeMoss Petrie for approximately 1.25 miles, turn west for approximately 0.1 miles, turn south for approximately 0.5 miles, then east for approximately 0.4 miles, then northeast for approximately 0.2 miles. (Freeway Route)
Purpose	Required to meet reliability criteria of a localized voltage instability specific to loss of both the North Loop-West Ina and Irvington-Tucson 138 kV circuits.
Date	
a) Construction Start	2014
b) In-Service Date	2014
Is Certificate Necessary	Case # 157

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	DeMoss Petrie – Northeast 138kV Line Reconductor
Size	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	DeMoss Petrie Substation
d) Point of Termination	Northeast Substation
e) Length	Approximately 6 Miles
Routing	Existing
Purpose	To increase TEP load serving capability.
Date	
a) Construction Start	2014
b) In-Service Date	2014
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	North Loop – Rillito 138kV Line Reconductor
Size	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	North Loop Substation
d) Point of Termination	Rillito Substation
e) Length	Approximately 11 Miles
Routing	Existing
Purpose	To increase TEP load serving capability.
Date	
a) Construction Start	2014
b) In-Service Date	2015
Is Certificate Necessary	No

**TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES**

Line Designation	Northeast – Rillito 138kV Line Reconductor
Size	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	Northeast Substation
d) Point of Termination	Rillito Substation
e) Length	Approximately 5 Miles
Routing	Existing
Purpose	To increase TEP load serving capability.
Date	
a) Construction Start	2015
b) In-Service Date	2016
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	DeMoss Petrie – North Loop 138kV Line Reconductor
Size	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	DeMoss Petrie Substation
d) Point of Termination	North Loop Substation
e) Length	Approximately 14 Miles
Routing	Existing
Purpose	To increase TEP load serving capability.
Date	
a) Construction Start	2014
b) In-Service Date	2015
Is Certificate Necessary	No



TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Future Toro Switchyard to Rosemont Substation 138 kV
Size	
a) Voltage	138-kV
b) Capacity	Load > 120 MVA
c) Point of Origin	Future Toro Switchyard that will be a loop-in of the TEP South – Green Valley 138 kV Line (Sec. 29 T17S R14E)
d) Point of Termination	Future Rosemont Switchyard (Sec. 30 T18S R16E)
e) Length	Approximately 13.2 Miles
Routing	Approximately 1 mile east from Toro, then southeast to the intersection of Santa Rita Road and Helvetia Road, then northeast to Rosemont.
Purpose	To provide electrical service to large mine load located east of Green Valley, AZ
Date	
a) Construction Start	2014
b) In-Service Date	2015 (Dependent upon approval of Mine Record of Decision from United States Forestry Service)
Is Certificate Necessary	Case # 164

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	North Loop Substation – West Ina Substation 138kV Line Reconductor
Size	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	North Loop Substation
d) Point of Termination	West Ina Substation
e) Length	Approximately 6 Miles
Routing	Existing
Purpose	To increase TEP load serving capability.
Date	
a) Construction Start	2015
b) In-Service Date	2016
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Tortolita Substation – Rancho Vistoso Substation Reconfiguration to Tortolita Substation – North Loop Substation #5 and North Loop Substation – Rancho Vistoso Substation
Size	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	Tortolita Substation
d) Intermediate Point	North Loop Substation
e) Point of Termination	Rancho Vistoso Substation
f) Length	Approximately 22 Miles
Routing	Existing
Purpose	To increase TEP load serving capability.
Date	
a) Construction Start	2016
b) In-Service Date	2017
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Orange Grove 138kV Substation
Size	
a) Voltage	138-kV
b) Capacity	System dependent
c) Point of Origin	La Canada 138 kV Substation
d) Interim Point	Future Orange Grove 138 kV Substation
d) Point of Termination	Rillito 138kV Substation
e) Length	Tap off existing line
Routing	Loop-in of the existing La Canada - Rillito 138kV circuit and drop into new station adjacent to the right-of-way
Purpose	Required to serve load at the new Orange Grove 138/13.8 kV Substation
Date	
a) Construction Start	2019
b) In-Service Date	2020
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Craycroft-Barril 138kV Substation
Size	
a) Voltage	138-kV
b) Capacity	System dependent
c) Point of Origin	Northeast 138 kV Substation
d) Interim Point	Future Craycroft-Barril 138 kV Substation
d) Point of Termination	Snyder 138kV Substation
e) Length	Tap off existing line
Routing	Existing Northeast-Snyder Corridor requires 1 span of wire to drop into station.
Purpose	Required to serve load at the new Craycroft-Barril 138/13.8 kV Substation
Date	
a) Construction Start	2021
b) In-Service Date	2022
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Irvington Substation –Tucson Station #2 138 kV	
Size		
a) Voltage	138-kV	
b) Capacity	System Dependent	
c) Point of Origin	Irvington Substation	
d) Interim Point	New Kino Substation	
e) Point of Termination	Tucson Station	
f) Length	Irvington – Kino – approximately 6 miles Kino – Tucson – approximately 5 miles	
Routing	To be determined	
Purpose	To increase load serving capability and reliability in Central Tucson.	
Date		
a) Construction Start	2020	
b) In-Service Date	2021	Irvington Substation to new Kino Substation to Tucson Station 138 kV lines
Is Certificate Necessary	Yes	

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Vail Substation to East Loop Substation through Spanish Trail and Roberts Substations, looping-in the Roberts-East Loop line to the new Harrison Substation.
Size	
a) Voltage	138-kV
b) Capacity	System dependent
c) Point of Origin	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination	East Loop Substation (Sec. 8 T14S R15E)
e) Length	Phase 1: Vail Substation to East Loop Substation - 22 Miles
	Phase 2: East Loop – Roberts – 7 miles Spanish Trail to Roberts – 5.75 miles
	Phase 3: Vail Substation to East Loop Substation - 22 Miles
	Phase 4: East Loop – Harrison – approximately 3 miles Roberts – Harrison – approximately 4 miles
Routing	East and north from Vail Substation along existing transmission line to Irvington and Houghton Roads, then north along Houghton Road to Speedway Boulevard, then east and north to Roberts Substation and west along Speedway to East Loop Substation.
Purpose	To provide additional electric service to the eastern portion of TEP's service area and to reinforce the local transmission system.

Date		
a) Construction Start	1976	
b) In-Service Date	Phase 1 - 1977 (Completed)	Spanish Trail Substation to East Loop and Vail Substation
	Phase 2 - 1983 (Completed)	Roberts Substation and associated 138-kV lines
	Phase 3 – TBD	Third 138-kV line from Vail to East Loop Substation
	Phase 4 - 2021	Harrison Substation loop-in of the Roberts- East Loop 138 kV line
Is Certificate Necessary	Case # 8.	



TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Hartt 138kV Substation
Size	
a) Voltage	138-kV
b) Capacity	System dependent
c) Point of Origin	Toro 138 kV Substation
d) Interim Point	Future Hartt 138 kV Substation
d) Point of Termination	Green Valley 138kV Substation
e) Length	Tap off existing line
Routing	Looping the existing South – Future Toro – Green Valley 138kV circuit and drop into new station adjacent to the right-of-way
Purpose	Increase load serving and reliability of existing 46/13.8 facilities near this site.
Date	
a) Construction Start	2021
b) In-Service Date	2022
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Interconnection of Tortolita – North Loop 138 kV with future TEP Marana 138 kV Substation
Size	
a) Voltage	138-kV
b) Capacity	System dependent
c) Point of Origin	Tortolita 138 kV Substation
d) Interim Point	Future Marana 138kV Substation
e) Point of Termination	North Loop 138 kV Substation
f) Length	Approximately 4 miles from existing circuit
Routing	Loop-in a circuit from the Tortolita- North Loop corridor at the Trico-Marana Rd. alignment and extend approximately 4 miles of double-circuit pole-line west across I-10 to proposed Marana substation site near Sanders Rd.
Purpose	Required to serve load at the new Marana 138/13.8 kV Substation located approximately 9 miles south-southeast of the Tortolita Substation
Date	
a) Construction Start	2022
b) In-Service Date	2023
Is Certificate Necessary	Yes

## Planned 138kV Reactive Projects

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TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Rillito Substation 138kV Capacitor Bank #1 Upgrade
Size	
a) Voltage	138-kV
b) Capacity	Exist: 36.7 MVAR, Proposed Total: 48.9 MVAR at 138kV
c) Point of Origin	Rillito Substation
d) Point of Termination	Rillito Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2014
b) In-Service Date	2014
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Irvington Substation 138kV Capacitor Banks #1 and #2 Upgrade
Size	
a) Voltage	138-kV
b) Capacity	Exist: 36.7 MVAR, Proposed Total: 48.9 MVAR at 138kV
c) Point of Origin	Irvington Substation
d) Point of Termination	Irvington Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2014
b) In-Service Date	2014
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	South Loop Substation 138kV Capacitor Bank #1 Upgrade
Size	
a) Voltage	138-kV
b) Capacity	Exist: 24.4 MVAR, Proposed Total: 36.7 MVAR at 138kV
c) Point of Origin	South Loop Substation
d) Point of Termination	South Loop Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2015
b) In-Service Date	2015
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Irvington Substation 138kV Capacitor Bank #3 Addition and Upgrade
Size	
a) Voltage	138-kV
b) Capacity	Phase 1(Addition) – 24.4 MVAR at 138kV Phase 2 (Upgrade) – 48.9 MVAR at 138kV
c) Point of Origin	Irvington Substation
d) Point of Termination	Irvington Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2015
b) In-Service Date	Phase 1 – 2015 Phase 2 – 2017
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	DeMoss Petrie Substation 138kV Capacitor Bank #2 Addition and Upgrade
Size	
a) Voltage	138-kV
b) Capacity	Phase 1 (Addition) – 24.4 MVAR at 138kV Phase 2 (Upgrade) – 48.9 MVAR at 138kV
c) Point of Origin	DeMoss Petrie Substation
d) Point of Termination	DeMoss Petrie Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2015
b) In-Service Date	Phase 1 – 2015 Phase 2 – 2017
Is Certificate Necessary	No



TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	North Loop Expansion Substation 138kV Capacitor Banks #1 and #2 Upgrade
Size	
a) Voltage	138-kV
b) Capacity	Exist: 36.7 MVAR, Proposed Total: 48.9 MVAR at 138kV
c) Point of Origin	North Loop Expansion Substation
d) Point of Termination	North Loop Expansion Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2016
b) In-Service Date	2016
Is Certificate Necessary	No

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	DeMoss Petrie Substation 138kV Capacitor Bank #1 Upgrade
Size	
a) Voltage	138-kV
b) Capacity	48.9 MVAR at 138kV
c) Point of Origin	DeMoss Petrie Substation
d) Point of Termination	DeMoss Petrie Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2017
b) In-Service Date	2017
Is Certificate Necessary	No

## Conceptual 138kV Transmission Projects

TUCSON ELECTRIC POWER COMPANY  
10 YEAR PLAN  
TRANSMISSION FACILITIES

Line Designation	Irvington Substation to East Loop Substation (through 22nd Street Substation)	
Size		
a) Voltage	138-kV	
b) Capacity	System dependent	
c) Point of Origin	Irvington Substation (Sec. 03 T15S R14E)	
d) Point of Termination	East Loop Substation (Sec. 08 T14S R15E)	
e) Length	Irvington – East Loop – 9 Miles	
	Phase 1: Irvington Station to 22 <sup>nd</sup> Street Substation – 4 miles	
	Phase 2: 22 <sup>nd</sup> Street to East Loop Substation – 5 miles	
Routing	North and East of Irvington Substation, through 22nd Street Substation, then East and North to East Loop Substation.	
Purpose	To provide additional electric service to the central area of TEP's service area and to reinforce the local transmission system.	
Date		
a) Construction Start	1985	
b) In-Service Date	Phase 1 – 1994 (Completed)	Irvington Station to 22nd St. Substation
	Phase 2 – 2000 (Completed)	22nd Street to East Loop Substation
	Phase 3 – TBD	2nd Circuit of Phase I
Is Certificate Necessary	Case # 66.	

# Effects of Distributed Renewable Generation and Energy Efficiency Programs

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Avoided Projects (Projects needed if DG &EE not considered):

1. North Loop-Rancho Vistoso Reconductor
2. Los Reales-Vail Reconductor
3. Irvington-Vail #2 Reconductor
4. Drexel Capacitor Bank #1 addition
5. Drexel Capacitor Bank #2 addition
6. RB-Wilmot Capacitor Bank #1 addition
7. RB-Wilmot Capacitor Bank #2 addition
8. Midvale Capacitor Bank #1 addition
9. East Loop Capacitor Bank #1 upgrade
10. East Loop Capacitor Bank #2 upgrade
11. East Loop Capacitor Bank #3 upgrade
12. West Ina Capacitor Bank #1 upgrade
13. West Ina Capacitor Bank #2 addition

Accelerated Projects (Projects accelerated if DG &EE not considered):

1. DMP-NorthEast Reconductor
2. Rillito-NorthEast Uprate
3. North Loop-DMP Uprate
4. North Loop Rillito Reconductor
5. Irvington Ring Capacitor Bank #3 upgrade
6. South Loop Capacitor Bank #1 upgrade
7. DMP Capacitor Bank #2 upgrade
8. North Loop Capacitor Bank #1 upgrade
9. North Loop Capacitor Bank #2 upgrade